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# FREE-LIVING NEMATODES FROM DARWIN MANGROVES

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## ABSTRACT

Species from 22 genera of nematodes are recorded from the sediments supporting *Rhizophora stylosa* Griff. mangroves in Darwin harbour. Most, perhaps all, belong to different species from those found in *Avicennia marina* (Forsk.) Vierh. mangroves in south-east Australia. Six genera have not been previously recorded from Australian mangroves, but are closely related to taxa which do occur in Australia. The taxonomic differences between the Darwin fauna and that of mangroves elsewhere in Australia are discussed.

KEYWORDS: Free-living nematodes, mangroves, Northern Territory, Australia, biogeography.

## INTRODUCTION

Although nematodes are very small relatively simple animals, they are probably the most numerous multicellular organisms on earth. They occur almost everywhere that life can be supported from the poles to the tropics and from the driest desert to beneath fresh or salt waters. However, records of nematode occurrences are very patchy, especially so for the marine nematodes, and the nematodes of tropical mangroves have been virtually ignored. This is no doubt largely due to their small size, but also due in part to the difficulties of sampling and extracting animals from the sediment as well as taxonomic problems. Despite these difficulties, marine nematodes are now thought important as nutrient recyclers (Platt and Warwick 1980; Heip, Vincx and Vranken 1985) and as sensitive indicator organisms for detecting pollution (Platt, Shaw and Lambshead 1984). Consequently, there has been increasing interest in marine nematodes.

In Australia, Decraemer and Coomans (1978) made a very limited taxonomic study of the nematode fauna from mangroves on Lizard Island, Great Barrier Reef. More recently, we began an extensive study on the meiofauna from mangroves in southern Australia (Hodda and Nicholas 1985, 1986a,b; Nicholas and Stewart 1985). The nematodes from northern and western Australia remain unknown. This paper presents the results of a preliminary survey from Darwin harbour. The genera present are recorded and compared with the fauna from elsewhere in Australia.

## MATERIALS AND METHODS

A small sample of mud (about 30 $cm^2$ surface area and 150 ml volume) was taken amongst *Rhizophora stylosa* Griff. mangroves at the Northern Territory Museum of Arts and Sciences collecting site on Creek "H" in Darwin harbour. Sampling date was 5 May 1986. The sample was taken by pushing a small inverted cup into the mud. The sample was immediately fixed with 5% formalin. The nematodes were extracted from the sediment by a combination of sedimentation, sieving and centrifugation described elsewhere (Hodda and Nicholas 1985).

Genera were assigned to feeding categories using the widely accepted scheme and lists of genera produced by Wieser (1953, 1959) and modified by Boucher (1973). Genera not included in these lists were allocated to the same feeding category as the listed genus with the most similar buccal morphology.

## RESULTS

Twenty-four species of nematodes were found (Table 1). The nematodes were sorted to specific level, but lack of previous taxonomic work makes it difficult to give

species names. However, we could assign most specimens to well-described genera. A comprehensive voucher collection and key to the genera of marine nematodes in Australia is currently being prepared by W.L. Nicholas with the support of the Australian Biological Resources Advisory Committee but this will take several years to complete. When the species are eventually described, type specimens will be deposited in the Northern Territory Museum of Arts and Sciences.

## DISCUSSION

That the species involved here are undescribed is not unusual. Almost 60% of the species found at Lizard Island were undescribed (Decraemer and Coomans 1978) and over 90% of the species from the Hunter estuary could not be reconciled with currently described species (Hodda and Nicholas 1985, 1986b). Given that most taxonomic descriptions are of species found

**Table 1.** Genera of nematodes collected from Darwin Harbour and their recorded occurrence elsewhere in Australia.

| Family<br>Genus from Darwin | Feeding† Category | Also Recorded* at Lizard Is. | Also Recorded** in Hunter Estuary, NSW |
|---|---|---|---|
| Desmoscolecidae | | | |
| *Quadricoma* | 1A | - | - |
| Chromadoridae | | | |
| *Actinonema* | 2A | Yes | - |
| *Spilophorella* | 2A | Yes | - |
| *Dichromadora* | 2A | Yes | Yes |
| Cyatholaimidae | | | |
| *Pomponema* | 2A | - | - |
| Selachinematidae | | | |
| *Halichoanolaimus* | 2BS | Yes | Yes |
| Desmodoridae | | | |
| *Desmodora* 2 spp. | 2A | Yes | Yes |
| *Desmodorella* | 2A | - | - |
| *Onyx* | 2B | Yes | Yes |
| *Metachromadoroides* | 2B | Yes | - |
| Monoposthiidae | | | |
| *Nudora* | 2A | Yes | - |
| Leptolaimidae | | | |
| *Camacolaimus* | 2A | Yes | Yes |
| Xyalidae | | | |
| *Filipjeva* | 1B | - | Yes |
| *Daptonema* | 1B | - | Yes |
| *Theristus* | 1B | Yes | Yes |
| Sphaerolaimidae | | | |
| *Sphaerolaimus* | *2BS* | - | *Yes* |
| Comesomatidae | | | |
| *Hooperia* | 1B | - | - |
| *Sabatieria* | 1B | - | Yes |
| Anoplostomatidae | | | |
| *Anoplostoma* | 1B | - | Yes |
| Oxystominidae | | | |
| *Halalaimus* | 1A | - | Yes |
| *Thallassolaimus* | 1A | - | - |
| Oncholaimidae | | | |
| *Viscosia* | 2B | Yes | Yes |
| Ironidae | | | |
| *Frissonchulus* | 2A | Yes | - |
| Dorylaimidae | | | |
| Unidentified genus | - | - | - |

† Feeding categories: 1A, selective deposit feeders; 1B, non-selective deposit feeders; 2A, epistate feeders; 2B, omnivore/predators; 2BS, specialised predators. 1A and 1B mostly feed on bacteria, 2A mostly on micro-algae, 2BS on other nematodes.

* Decraemer and Coomans (1978).

** Hodda and Nicholas (1985, 1986b).

in Europe, it is not surprising that tropical species are mostly different.

Although the species are different, the genera found in this preliminary study are typically found in marine and estuarine sediments elsewhere. There are marked differences when comparisons are made with the fauna of mangroves elsewhere in Australia. Thirteen of the 24 genera are also found in sediments under *Avicennia marina* (Forsk.) Vierh. mangroves in south-east Australia (Hodda and Nicholas 1985), however, most are different species. Twelve of the genera were also found in various species of mangroves at Lizard Island (Decraemer and Coomans 1978). Examination of the Lizard Island material is necessary to determine how many species are common to both sites.

There are many ecological similarities, despite the taxonomic differences. The number of species found is similar to that found in samples of a similar size in southern Australia. Unfortunately the number of species is difficult to compare with estuaries elsewhere in the world because published accounts state mean results for a number of cores only so comparisons with other areas are not possible. The genera present here, but absent from southern Australia, were generally closely related to genera found in the south, giving a similar distribution of species amongst the different families. For instance, members of the families Xyalidae, Desmodoridae and Chromadoridae are prominent both in the Darwin fauna and New South Wales (Hodda and Nicholas 1985, 1986b). The only major difference is the apparent absence of Monhysteridae and Linhomoeidae which are frequently present elsewhere (Decraemer and Coomans 1978; Hodda and Nicholas 1985, 1986b), but not much weight can be given to a single sample.

Much more extensive sampling will be necessary before a definitive inventory of the fauna from mangroves in the Darwin area can be made. The fauna of the Hunter estuary was quite variable over both space and time (Hodda and Nicholas 1986b) so considerable effort will be required to adequately cover the wider range of mangrove types in the north. Although there were no consistent seasonal patterns in the fauna of the Hunter estuary as there are in Europe (Heip, Vincx and Vranken 1985), there were significant changes over the seasons. Samples from Darwin in both wet and dry seasons could be taken to determine if there are any consistent changes in fauna between the seasons. Seasonal differences in salinity within mangroves may influence the composition of nematode fauna. An estimate of relative abundance for each species would also be useful as a means of assessing seasonal changes in fauna.

We conclude that the nematode fauna of mangroves around Darwin appears different to that so far studied elsewhere in Australia and warrants further study. We have now undertaken further sampling in an attempt to answer some of the outstanding questions.

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## REFERENCES

Boucher, G. 1972-3 Premieres donnees ecologique sur les nematodes libres marins d'une station de vas cotiere de Banyuls. *Vie Milieu* **23** B: 69-100.

Decraemer, W. and Coomans, A. 1978 Scientific report on the Belgian Expedition to the Great Barrier Reef in 1967. Nematodes XII. Ecological notes on the nematode fauna in and around mangroves on Lizard Island. *Australian Journal of Marine and Freshwater Research* **29**: 497-505.

Heip, C., Vinex, M. and Vranken, G. 1985 The ecology of marine nematodes. *Oceanography and Marine Biology Annual Reviews* **23**: 399-489.

Hodda, M. and Nicholas, W.L. 1985 Meiofauna associated with mangroves in the Hunter River Estuary and Fullerton Cove, South-eastern Australia. *Australian Journal of Marine and Freshwater Research* **36**: 41-50.

Hodda, M. and Nicholas, W.L. 1986. Nematode diversity and industrial pollution in the Hunter River estuary, South-east Australia. *Marine Pollution Bulletin* **17**: 251-5.

Hodda, M. and Nicholas, W.L. 1986b Temporal changes in meiofauna from the Hunter River Estuary. *Australian Journal of Marine and Freshwater Research* **37**: 729-739.

Nicholas, W.L. and Stewart, A. 1985 *Criconemella avicenniae* n.sp (Nematoda: Criconematidae) and *Enchodelus coomansi* n.sp. (Nematoda: Nordiidae) associated with the roots of the mangrove *Avicennia marina* (Forsk.) Vierh. *Nematologica* **30**: 429-436.

Platt, H.M. and Warwick, R.M. 1980 The significance of nematodes to the littoral ecosystem. In: J.H. Price, D.E.C. Irvine and W.H. Franham (eds) *The Shore Environment, Volume 2, Ecosystems*: 729-59. Academic Press: London.

Platt, H.M., Shaw, K.M. and Lambshead, P.J.D. 1984 Nematode species abundance patterns and their use in the detection of environmental perturbations. *Hydrobiologia* **118**: 59-66.

Wieser, W. 1953 Die Beziehung zwischen Mundhohlengestalt, Ernahrungsweise und Vorkommen bei freilebenden marinen Nematoden. *Arkiv fur Zoologie* **4**(2): 430-484.

Wieser, W. 1959. Free-living marine nematodes. IV. General part. Chile Reports 34. *Lunds Universitets Arsskrift N.F. Adv.* **55**(2): 1-111.

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